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AVIATION

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OPERATING IN THE *Polar Regions*

By Captain Sir Hubert Wilkins

TRAINING COMMERCIAL PILOTS IN *Germany*

THE *Small Dealer's* PROBLEMS

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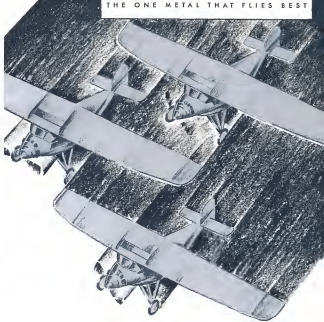
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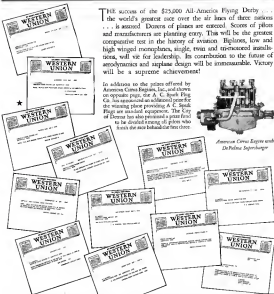
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THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A MONTHLY PUBLICATION ESTABLISHED 1896

EDWARD P. WARNER, Editor

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Flying Flag Pole Sitters

IN KEEPING with the celebration of the anniversary of Lindbergh's most famous flight, come the usual reports of attempts soon to be made to do more or less the same thing. For some unknown reason the Atlantic Ocean holds more attraction for aviators than a large tin can holds for the American housewife.

We can to a certain extent appreciate the desire of some pilots, whose names have not yet found the front page, to go forth and conquer the weather above the North Atlantic. To them it appears like opportunity for fame, such as it may be. To them it is a chase, (a very thin one) to be resorted to in history as being among the misadventures of aviation. To them it probably looks like a sporting chase that is worth the taking. They are young and naive of them; do not know better, but they have that ingrained enthusiasm and indomitable will that carry them through.

However, what we cannot understand or comprehend is the desire of famous pilots to emulate Lindbergh's flight. They are men who are wealthy in experience. They know the cost, the loss and the profit. They have already made famous flights, and while making those flights they were undoubtedly spurred on by the thought of what their achievements would contribute to the progress of aeronautics. They were pioneers pushing out the frontiers of the aviation world. They successfully showed their skill and by their courage and ability are now too busy to be so concerned to be beyond our power to picture in words.

Why, then, must they who contributed so much to progress risk their lives or careers which will not contribute anything new? And if that alien cause within them still urges them on, why must they use equipment that is old and tried, though good it still may be?

For many hours they have sat in their respective cockpits and more or less accurately determined the type

of their craft. They may know it from prop to tailfin. They may possess 100 per cent confidence in the ability of their craft to "make the grade." Perhaps in their own minds the flight is already made and the rest is mere nothing.

But what of that? Supposing they do cross that shivering body of water: what will they gain? What will they prove? And what will they contribute? We feel that the general answer is... very little, if anything. If they land in New York they may get a free ride up Broadway and be congratulated by the Mayor. It will be in the newspapers for perhaps a day or two, but as a matter of fact, the general publicity will fall far short of that which they secured for previous flights. Their gains will also be far less than that which they have, already received and their flights will not prove a thing which is not already known. We know and the public knows that the North Atlantic can be crossed by air. We know and the public knows that the most exacting, and in some instances the most dangerous, of both flights have already been made and all worthwhile time on planes and engines of the type to be used have been utilized. So even were we to contribute a thing to aeronautical progress.

On the other hand if the flights fail the cost and the loss will probably never be known. There is no machine or mathematical process by which we can calculate the effort that failure and death will have upon the minds of those whom the industry is desperately striving to educate to the value of the airplane in daily life. Not least of all will be, thoughts in the minds of the public that, once again, famous aviators have taken the long trail that flying seems destined to take us and eventually that men who contributed so much have they themselves turned cowardly, and perhaps a bit hypocrite.

For years we of the industry have talked ourselves

line is the fact about aviation. We have taken even more of an interest to prove to the man in the street that the airplane is for him; that it is a new and better method of transportation for him, and that it is to his advantage to regard it as such and act accordingly. We have pointed out the progress of aeronautical development as far as possible by the courage and ability of our famous aviators.

In short, we have succeeded in making the public accustomed to a certain extent, and that extent includes the ability on the part of the public to distinguish between foolhardy and experimental flying. Undoubtedly the knowledge can now act as a booster to aviation. Here we can expect to consistently build up the public's confidence of our own history and place themselves in the light of full-fledged pilots. And here we can expect to keep the public convinced that development is really going forward if those who so unreasonably helped us to when we are today torn apart and run the useless risk of being chased to death.

Aeronautical development has taken a toll in lives of men and women and we must face the fact that experimental development will continue to take as toll in lives but with an ever decreasing degree. That is nothing new, it is but the equation of standard and status man history. And what is more, the major part of the public is not blind to this fact.

Therefore, why run the risk of underestimating all the beliefs that our heroes, dead and alive, have instilled in the public? Why build up a house and then tear it down to be built again? If an aerial venture will contribute to aviation progress then the risk involved may be considered as justified, but if the success of the venture contributes nothing the risk becomes divided and the flight unjustified. Personal glory can be the only reward for such an achievement and that type of personal glory is to our mind dispensable to the glory enjoyed by the problems who sit atop a flag pole.

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Government and Industry

TOWARD a branch of industry, the government under which it lives may show itself friendly, hostile, indifferent, or all three in turn. Halfhearted were our first failures of solicited attention and direct assistance from Washington and that within a few years they became the object of an unvarying watchfulness, the results of which bordered on persecution. The air force may well go through the same experience at some time. So far they have nothing of which to complain. The executive and legislative branches of the Washington government have alike been sympathetic to the whole despicable (and individual) commercial methods

over accident publicity and other aeronautical themes. But that very fact makes it advisable, particularly with regards to governmental relations in early stages, that the industry take stock.

What do we want Washington to do for us, and how? Two years ago American air transport failed to find itself committed to, and finally accepting, the fundamental policy of getting along without direct subsidies. For foreign lines, both in the Foreign Air Mail act as originally passed and in the subsidy cases and bill now under consideration, that policy has gone by the board. For domestic operation, the Warren bill for the first time frankly discards it, at least so far as other purposes have now endowed with such contracts are concerned. What next?

Transportation services were balanced from our own to the making of direct governmental grants to every sort of private undertaking that can prove a public utility or as of national importance, one with rare exceptions, has been accepted the industry as a permanent feature of civil aviation. Five or six years ago, expressions of antipathy to its elimination were frequent. Now they are absent. We do not believe that either the Congress and the people of the United States, nor the American aircraft industry, intend to reject themselves permanently to governmental management of commercial flying, at least in the same-old spirit. Certain elements of a two-tiered character have been and still are necessary for aviation, in what will continue to be a pioneering stage. Now is the time to make up our minds that they are necessary. Now is the time to decide just what form they should ideally take, how far they should go and what courses we should pursue in meeting them then without compromise. Upon that line, and with concrete and specific hopes of improvement held out for the future, the industry will lose the enormous chances of getting from Congress, the executive departments, and perhaps from the several states, what is urgently required in the present.

The same applies to other forms of governmental intervention that the industry and we should give consideration to possible activities and forms of assistance that have not so far been seriously considered in the United States—especially in "propaganda" both at home and abroad. Several European governments, for example, have sent or plan soon to send official or semi-official "missions" to South America. Direct American governmental activity on parallel lines has been confined to the dispatch of a special aeronautical trade commissioner by the Department of Commerce. He is to visit, should be a permanent feature. Perhaps the government should go further. We advise to favor a joint military and civil mission, a special tour by a couple of squadrons of personnel picked from both services for their linguistic and diplomatic qualifications as well as for their technical proficiency. Such squadrons should be furnished with aerial equipment offering a good range of samples of the American industry's products both military and

commercial. We can well afford it and if it is properly done, the aggregate benefit to the people of the United States will exceed any possible cost. The southern lines of Liebermann, Doolittle and Coddley, as well as many other American aerial ventures, have been of incalculable value both to the American industry and to our general relations to the south.

There remain limited possibilities at home, but there we take the other side. The French Air Ministry has recently formulated a project as yet unworked, for a "course of aerial school propaganda" to tour France. That the word is considered to exist is the best evidence of the extent to which truly commercial flying in the United States has driven that in France, and various other European countries, notwithstanding its original achievement in certain fields. In America, the Lindbergh tour did that job once and for all, except as purely commercial ventures may become feasible and be accepted by individual companies. As long as the Department of Commerce has no need to propagate, and as to do so would be a futile diversion of effort. Around the Department's efforts for the appreciation of American products should be concentrating, and the Army and Navy ought to participate. The industry has a right to expect liberal support in the export field, but the industry must cooperate in the government's effort and vigorously follow it up.

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For Air Transport Safety

WITH the subject of safety in air transport much to the fore in the public mind as a result of a number of bad accidents, it was to be expected that some quite definite action on the part of the government would result. It has arrived in the shape of a system of Certificates of Authority by which airlines, in effect, will be licensed in accordance with high standards of personnel, equipment and operating methods.

This rather radical step may also not merely to satisfy the general desire for greater safety. There is a complication involved in the form of a much feared threat from certain members of Congress to have scheduled interstate air transport removed from the jurisdiction of the Department of Commerce and placed in the hands of the Interstate Commerce Commission. For various reasons the industry shudders whenever such a possibility takes as head those the Commerce and the Certificate of Authority system is designed to forestall any move in this direction.

We are in favor, of course, of anything which helps to reduce the margin of safety, if it is reasonable in concept and application and does not impose an unfair burden upon any worthy company in a business which already has plenty to worry about. Secretary Clarence

M. Young expects that the Certificate of Authority will bring about an era of safety in air transport which has never been experienced before in this country, and we most certainly hope that will be realized. Considerable improvement is the least we should anticipate from such a fundamental move in the field of foreign air regulation.

The smaller companies not operating on the federal routes probably will experience the greatest difficulty in meeting the requirements. Just because the government has not got around to installing over a particular route the airway rules which it insists are necessary for safe operation does not mean that they may go on operating without them. Whatever an aircraft may be supplied and if not by the government, then by its financial company. This will mean some rather heavy investments in ground facilities here and there, but it will mean also that companies not adequately equipped or not seriously financed will be eliminated in the interest of public safety.

The Department of Commerce naturally stands to bear the chief burden imposed by the new regulations. This organization is assuming the task of establishing the maximum standards, and faces the responsibilities involved in enforcing them. A difficult and delicate task lies ahead involving considerable wisdom both in the selection of the people who are to be licensed and in the handling of the inevitable appeals. The latter effort always has the chance to be an unbridled or unreasoned battle. May the Department justify our confidence in its inherent fairness.

Although the application of the whole plan will mean a considerable narrowing down of the classes of things going to air transport operations, it should not be forgotten that it is a comparatively simple matter to regulate materials and methods in comparison with controlling problems of personnel. This may prove to be the most difficult aspect. Even when we surround a man's behavior with a set of regulations, and even if he is sympathetic toward them, there yet remains the tremendously important question of personal capacity.

Judgment is the epitome of the capacity of a person or an organization. It is born of all the attributes of personality, integrity, ability and character. We have rather stereotyped certain personal types in times past but it should not be forgotten that transport work is a new industry, within an industry, and that speaking for the moment of the pilot alone, it should be recognized that there is to be developed a breed of transportation pilots with their particular characteristics, even as we have had a breed of military pilots.

But judgment has been the bugbear in the past and it may continue to be so should the government, and the individual companies, fail to exercise constant supervision under the provisions of the Certificate. We venture to predict that extra precautions in this particular direction will accompany most of what the new plan is designed to bring about.

THE PROBLEMS OF *Polar Flying*

Some Interesting High Lights on Sir Hubert Wilkins' Aerial

By CAPT. SIR HUBERT WILKINS

SOME seventeen years ago it does not seem as if it commonly did not open others that it would be far easier and more economical to fly over certain routes than to use any other method of transportation. This applies, particularly to the Polar Regions. I was confronted with the necessity on the Stockholm Arctic Expedition of carrying behind dog teams, saving for the dogs, and sometimes of dragging by human effort both dogs and sledges over the rough ice ridges. To fly would not only be much easier and more comfortable but, I believe, in the matter of geography, much more profitable. Yet there were difficulties in the way.

On my first long sledge journey, I had frozen my nose and toes and fingers and I realized that neither human nor machinery could be subjected to extreme temperatures with impunity. Subsequent experience taught me that it was in any manner to protect one's self from the cold and masses around me that it could be possible to protect the engines also. If we could provide our sensitive bodies we could by means of insulation protect the engines against far flight. No one would reasonably expect an engine directly exposed in its normal temperature in freedom will be at a temperature of 50 deg. below zero. No one would expect the operators of these engines to expose themselves to such temperatures, and rather than get the engines to start and function in these conditions we chose to change the conditions immediately surrounding the engine.

Chairs having realized that this could be done with insulation it was as easy matter to provide it. We could protect any sort of an engine from the cold and that was why we chose for our first Arctic Expedition two water-cooled Liberty engines and three air-cooled Wright Whirlwinds. The method of protecting both types was easy or less the same. We provided extra close-fitting cowls and controllable shutters. It might be interesting to note that I did my best to persuade the manufacturers to build for me the type of cowling now known as the M.A.C.A. but at that time—1921—nobody was supplying the material would after me to me such a consideration on their machines. To keep the oil from

cooling too rapidly we wrapped the oil lines and tanks with insulation which was then taped and shrouded.

These methods together with the use of a double fabric cover—was the inner, porous, and the outer not waterproof but weather proof (there was no rain in coastal regions in the polar regions during the most suitable time for exploration) was all that was required to protect the engine while at rest. There is a good reason why the fabric covers should not be waterproof. If they are not porous the condensation of the warm air provided for heating the engine will form on the inside so that on a rubber case and the engine wires will get damp and other parts of the machinery will rust.

The engines at work with suitable cowling will keep themselves warm enough and we found it advisable throughout the period of service, to always maintain the engines above freezing temperature. This was done usually by means of the danger which might be caused in the difference in the coefficient of expansion of the metals used in its construction. The constant warping was easily and conveniently provided, where electric service was not available by hanging inside the engine area one or two ordinary hurricane lanterns which turn persimmon and which will burn unattended for 24 hr. at least. The engines being maintained always above



Four members of the second British Antarctic expedition, left to right, Victor Egan, Sir Hubert Wilkins, the Doctor, and Al Christensen.



The Lockheed being off from the ice by the derrick on the second Antarctic expedition.

Ventures into the Arctic and Antarctic Regions Are Told Here

freezing point was easily heated with a propane stove to working temperatures before attempting to start them, by heating the oil before pouring it into the tanks (easy starting was assured). This never failed with the water-cooled or air-cooled single-engine machines, but it did not always work with the three-engine air-cooled machines. It sometimes happened that one or other of the engines would balk after starting and then the others, killing would end to such an extent that the oil would not circulate. This caused a great deal of trouble, and it was the reason why after the first year of airplane exploration in the Arctic I chose to use single-engine machines.

Insistence of experience was another great consideration. It is not a difficult matter to shatter a small machine which with a single engine and more efficient performance gave equal range. This was particularly true of the Lockheed Vega used on our third Arctic Expedition and on our two expeditions to the Antarctic. Two men, at a push, could handle such a machine whereas it took several men to move the heavy and not very reliable three-engine machine. The question of reliability is of course debatable, and depends upon circumstances but as applied to the conditions we faced, where every available horsepower is needed to take off and keep the machine in the air there was not any substantial factor of safety in a three-engine plant any greater number of engines to go wrong.

Another thing to be considered was the cost and convenience of transportation to the base of operation. Big airplanes need big ships for transportation and extra work in disassembly and reassembly. We carried our Lockheed Vega from Southampton to New York, from New York to the Antarctic and back to South America completely set up and ready for flight. This season, after flying for about 4500 miles in the Antarctic, we launched our machine from the deck of the transport to the ship and flew to port, reaching it every hour ahead of the steamer. The steamer was delayed only twenty minutes from the time the order was given to "stop the engines and it was at full speed ahead again. This could not have been done so expeditiously with a larger heavy plane.

Exploration by airplanes in the polar regions should not be considered only from the adventure's point of

view, but also from the point of view of economy. Of course, if it is looked upon as a means of advertisement and publicity that is a horse of a different color, but when used for exploration the cost per mile of flight and the geographical results obtained should be looked into.

Because the financing of an expedition is a matter of public interest and as it is generally accompanied by means of public support I will give, roughly, the cost of our work, giving it all in the chronological order.

In the Arctic we flew a total distance of more than 1500 miles and the cost of work for three years was less than \$15,000—about \$10 per mile. This cost included the purchase and transport of the machines by rail and steamer from New York to the base of operations and back again. Our two years' work made more than 6,000 miles of flying in the Antarctic cost about \$50,000. In figuring the cost the value received from the sale of the used machines and equipment is deducted.

The cost per mile is not the only thing to be considered on a geographical expedition; the amount of new territory covered should be taken into consideration. In the Arctic, one-third of the distance covered, or 1,800 miles, was over territory never before seen by man. In the Antarctic twenty-five per cent of our flying was over country never seen before. It is difficult to estimate such territory in square miles but our Antarctic discoveries included 1,800 miles of new coast line, 14 new islands, many mountain peaks and glaciers, two channels, a wide, long strait and a new part of the Antarctic coastline, not to mention in detail new sea areas where land was supposed to be. We have qualified geographers to push back the fringe of the Antarctic continent by 7 deg. or as far as New York to Charleston, St. Louis to New Orleans or from Berlin to Georgia. As to the value of these discoveries, only time will tell.

But to get back to the problems of operation, I have referred to the cold and some part of the equipment. The light type of planes we used during the last three years encountered a great deal of the difficulty experienced with data on big machines. We tried both wood and metal skins, and for use on polar ice and snow I prefer those made of wood. The type we used were of six-cow design and made of one piece of birch 10 in. wide, 9 ft. long and 1 1/2 in. thick at the outer end of the skin. The bottom running surfaces were grooved in the outer leaving an

well and a quarter full runway on each side the groove at the center three quarters of an inch deep. This considerably increased the bearing surfaces without enlarging the track. It has been my experience that long runways should be built for other reasons, about the more so hard and gravel. In the Arctic we took off with our Lockheed Vega plane from snow and ice with loads amounting to 300 lb per sq ft of area. In the Antarctic, unfortunately we could not find a level surface of any kind, even half a mile long. The runway of volcanic ash, clinkers and stones at Ross Island Island was only suitable for check and our flights in the south were made with other wheels or pointers.

It is often to be equipped for all conditions as were equipped with three sets of landing gear, pointers, skis and wheels. This year we had both ordinary and large sized wheels. The extreme weights required from our machines made it unwise and almost impossible to carry anything but the most essential equipment (machine instruments) at the time we landed with the 1,200-mile range which we required. We used both used and new positions. The wooden pointers were much heavier than those of metal and were therefore easier to carry along flights. The lack of both sets of pointers were strengthened with wire mesh and were used on snow or ice but as we were never allowed to land with pointers on snow we are not sure that the arrangement was satisfactory.

The greatest difficulty we had with pointers was in trying to take off from high rough snow. We made four attempts with our 1,200-mile pointers to rise from snow more than three feet high and might have succeeded had it not been for a very steep cross wind. As it was, and due to the full fueling by Al Cheson, no greater change in the design of the machine and struts were needed, however, stable single flights from beneath our visual view was more than 100 miles from land and over water 1,500 fathoms deep. Some of these take offs were made from water which was whipped into white misty waves by the wind. Other surprise flights were made from clung-together ice formations.

It might be thought that surprise flights in the Antarctic would be difficult or impossible because of the temperature, but only once this summer when about 100 miles from the South Pole did we experience difficulty with our formation. The cause was the fact that anything else might draw attention to the fact that the summer temperatures in the Antarctic, even though surrounded by ice flows and ice bergs, is not so very low. The summer temperatures in the lowest temperatures registered between November and February in the area we visited. In the Arctic are the ice in late winter and early spring in temperatures 86 deg. F. below freezing and suffered no harm or inconvenience. This speaks volumes for our equipment, the Wright Whirlwind and the Lockheed Vega. In this plane we carried our tanks in 110 deg. F. in the shade in California. Now across the Arctic is fifty-four below zero weather, shipped at unwarmed across the Atlantic, into it throughout the length and breadth of the United States, shipped it through the tropics to the Antarctic. Until it is dropped in the Antarctic summer weather it has been left in the dark, dried and became saturated with sea water. It was cleaned, dried out, flown and then stored—the fuelage and engine—in the open throughout an Antarctic winter. (The wings of our two machines were required and stored.)

This summer we reconstructed the machine, flew it for more than 3,000 miles over the Antarctic, back to the continent, shipped it to our Uruguay, then put it over the side of the vessel, flew it to Africa and on to Buenos Aires, where in good order and condition it was sold to the Government Civil Aviation Department of the Argentine. No sewer test need be carried out in order to prove the serviceability and hardness of this type of plane. This does not mean that I champion all wood construction equipments, but for our purpose it was ideal. The high wing, high, full cowling, nose gear and of special advantage is its particularly when we had to transport it, we got ready to fly, on small steamer in rough seas and when it was necessary to frequently change the landing gear. On the shores of the Antarctic there is no or no convenient or no landing tracks for landing the plane so when on the beach a dense mass of wood in the shape of a high landing pole—one under each wing—was used for moving the machine and changing the wheeled and pointer gear.

This car and landing gear was fitted with Goodrich wheels. We found them particularly advantageous as the landing field at Elephant Island. During the season the field went through a variety of changes from being covered in parts with two feet of snow, in others rough, frozen lava, to a condition of soft dirt snow and water-washed ground. It was found that the wheels were better on dirt than on soft snow and on icy water wheels. The large steel wire wheels with the pointer.

One of the most serious we had was the transport of the machines and supplies from the land to the flying field. This was done with the use of a light Clerc Tractor, the lightest one could find. But the comparatively slow moving tractor could not satisfy all requirements, so we provided a small, light, Italian motor car. By chaining an extra roller to each wheel on the car, using eight wheels in all, we found that the car could cross almost any kind of surface we met and that steady and steady movement, the first one to be used in the Antarctic, proved to be extremely serviceable.

By all these mechanical arrangements we provided for us into the air and the equipment in the air, flying, apart from successful flying, is that of navigation. For that purpose the American Geographical Society purchased a special map of stereographic projection and projected a simple hand-drawn method of determining position from the map. This method of course on solar observations took with regard to the shadow and shadow of the sun. It is a method particularly suited to high latitude navigation in the summer when the sun is above the horizon all day or rather for two or three months without setting. Any navigator could claim such maps and instructions from the American Geographical Society's School of Surveying, New York.

I used in connection with that method, a true-time Air Force bubble sextant. I will not describe it because there is no available single word to describe it, and equally suitable systems manufactured in this country. I found it not difficult to get from the cabin of our plane sufficiently accurate angles of the sun to fix our position with comparative accuracy. When passing the sun, however, it left the light in the air, so that the sun would be visible from a position behind the wing and from where the navigator's compartment was located. All airplane navigation and so far for exploration has depended on certain aids from ground observation. The speed and drift indicator I used was

also a true-time instrument made by Hughes and Son of London and used on which the ground speed of the plane and the wind direction and velocity were graphically displayed. My experience has been that it is easier to interpret graphs which require to be consulted at some later time than to calculate by slide rule. But as there are no more modern and more efficient drift indicators available I will not describe in detail the one I used.

For maintaining direction we used four types of compass. The pilot was provided with the usual airplane, non-magnetized type and a Highman, spirit level. I used an observer's type spirit level which is fitted a platform for compasses in rolling bearings of the sun and geographical points of interest, and in extremely sensitive compasses of the large, pocket type. By keeping constant check on the swing of the sensitive instrument and a regular check on the spirit level and recording the reading of each at every swing and using the slotted tape between each swing, I could readily plot on the map the actual course of the machine—not forgetting to apply, of course, the observations made of the ground speed and drift. The keeping of this sort of a few constant record required much time and mental application, but after considerable experience it becomes more or less automatic and leaves time for taking photographs and for observation of the macrological and service conditions.

ALTHOUGH CALCULATIONS and observations must be taken into consideration when dealing as to the altitude at which to fly and my experience has proved that successful navigation depends not only on horizontal direction but vertical as well.

Much time can be used by taking advantage of the favorable atmosphere and after considerable study one becomes efficient in judging from after the conditions of the atmosphere. Considering everything, as aerial navigation was never seen and never felt is, I have every moment of the flight. Without such carefully recorded it would have been impossible for us to have located South Georgia exactly after a 2,500-mile flight—2,500 miles from coast to coast, or to have found our way day after day over 400 miles and back to the "Green Sea." A wind only 150 ft. in length and with gusts less than 30 ft. From 400 miles away, after flying out through many snow storms, the wind seemed to us even less than a speck in the sun. Most of our trips the sun came made on an overcast sky and through frequent snowstorms without even a sight of the sun and when "ideal reckoning" only could be used. Our method of surveying is a reconnaissance way, the new land discovered was by time and distance, dead reckoning and photography and by direct bearings taken of known and fixed geographical positions.

But all the tricks and knowledge of navigation must have enabled us nothing as it was for the full pilotage of the plane and the consequent cooperation between pilot and navigator. In this respect our conditions here, been extremely fortunate. The late Carl Ben Eklund



The Lockheed Vega set up on ice. This plane was used by George Hibben and John Usher. Carl Eklund.

was in ideal pilot and companion in this respect, and severely lost in this plane. Al Cheson and Parker Ginner accompanied me this year. Of course the serviceability of our machines depended on the state of the plane and in Civil Porter we had a more efficient and reliable companion. In the last three years we have not had one forced landing and very little delay because of the engine. The only serious inconvenience experienced was because of frequent condensation in the gas tanks and fuel lines. Before each flight it was necessary to be sure that each tank was free from water and several times it was necessary for us to remove the whole fuel line system and heat the pipes to free them from ice which had collected between flights.

Weather direction finding is not yet possible on pioneering flights of exploration or at least not for long flights up to 150 miles from a base camp. Our Hibben and Kurfina short-range airplane sets kept us in constant touch with our base while we were in the air. During our Antarctic flights we carried two reflector lights, 20-watt red-light sets for use in flight and a light position light for use with the base observation of forced to land. We had a fifteen-watt head-down set in case we had to alight the plane and walk home.

For the extreme equipment as carried with us in the plane food and equipment outfit for each man 120 lb. in weight. These were carried in sleds as over a period of two months and clothing and other equipment for two years at least. It would, of course, always be possible anywhere in the Arctic and along the coasts of the Antarctic to get sufficient food to sustain oneself indefinitely, provided that one knows the method of hunting and securing food in those regions.

The details of clothing and other equipment depends on the type of man who will use it and the conditions in which he will fly. It is essential to realize the fact that in the Antarctic at least we did not need to wear our gear, because clothing and gear is very important, and fortunately we carried out the essential part of our program without serious uniformity or adventure.

Our program, briefly, was to find, describe, points from which useful macrological data might be economically collected and to divide up the most economic means of communication with them. One of these points must necessarily be south of the Pacific Ocean. That and other points have been determined and while doing so we were able to carry out the geographical work outlined earlier in this article.

TRAINING OF COMMERCIAL PILOTS IN Germany



A seaplane (right) near landing
at A. Heide (left) airport.

AS IS well known, Germany has an airway system and, for that reason, much of the money and effort that would normally be spent for the training and education of airway and naval pilots are directed to the development of men for commercial work.

The work of training these pilots is entrusted to the Deutsche Verkehrsfliegerschule, usually called the "D.V.S." for short. This organization, which has been in existence more than four years, works in close cooperation with the operating companies employing its graduates. Because among these is the German Lufthansa, through many of the men find positions in other companies and abroad.

As German aviation is isolated by the government in the form of a monopoly, there is a good number of applicants each year to take these training courses. Therefore there must be considerable weeding out in order to select the best men for the complete course.

For those who are of the opinion that requirements for flying licenses in this country are too strict we call particular attention to this article which deals with the operation of the German school known as the Deutsche Verkehrsfliegerschule, or "D.V.S." for short. In this country flying instruction is regarded in terms of months whereas in Germany it

The flying course given by the "D.V.S." for full transport licenses are divided into two groups, one for land pilots and the other for seaplane pilots. The land course is three years, full time, while the sea course is four. The first year and a half the two courses are identical and in that time fundamentals in land plane operation and flying lessons is given. All through the entire course of study a great deal of time for both land and water pilots, is devoted to navigation and radio, so that when the men finish they not only have the highest commercial pilot's license but also the qualifications of a second-class marine navigator and radio operator second class.

Though it must be said that the school is run on a military basis, there is considerable discipline. All men are residents at the school and though they are given considerable freedom and frequent leaves in the complete course of instruction many of the students spend much time "confined to the boundaries of the flying field" or "confined to quarters." As in the States, flying time is one of the major prerequisites for advancement because the student naturally desires to go through a man ("startenber") from one to thirty days. A man is often

is regarded in terms of years. One particular point of interest that Mr. Mock brings out is that out of almost a thousand applicants only an average of twenty-five are finally accepted for instruction. Student tuition is another of the many interesting items that are well worth the consideration of those now struggling with flying school problems.

An Interview With
HEINRICH BECKER
Director of the Deutsche Verkehrsfliegerschule
By
RICHARD M. MOCK
*In Charge of Design and Construction
at the Ernst Heinkel Flugzeugwerke*



The D.V.S. school and Heinkel plant photographed from over the water. 1, wireless hangar; 2, Heinkel factory; 3, airport office; 4, D.V.S.; 5, D.V.S. hangar; 6, D.V.S. hangar; 7, Heinkel hangar; 8, D.V.S. hangar; 9, D.V.S. hangar.

repeated to leave the school after he has been grounded a second time.

Naturally, since the finances of the school are quite limited, there must be a great deal of selection in reviewing the applicants to insure that only the most promising students are trained. Though the school is subsidized, each student must also undergo considerable expense and for that reason only the financially able can complete the course. The financing of the school may be compared to that of an endowed university operating under high expenses and endeavoring to have its students chosen from the best of the country's young men. In German opinion, it is not possible for a private owner to run a flying school on a commercial basis without subsidy, and give a thorough commercial education. The German schools operate under a high expense using large transport machines of high power, similar to the planes the men will later fly with in traffic.

After they enter the school all students are on the same financial basis. Each student must pay his own living expenses at the school. This amounts to 165 marks a month (currently this is about \$4000), though the purchasing power is close to \$8000. From this the student gets 25 marks for spending money, with the rest for board, room, clothes, books, etc. This is quite expensive for the average German young man who is not able to earn anything for so long a period. If a student is a very promising pilot he can borrow money from the school and pay it back later at the rate of 10 per cent when he has secured a position as a pilot. Each student must pay 5000 marks (\$1200) for flying instruction for his first license called "A" for land machines. The financial salary of the school comes from the budget of the Ministry for Transportation and covers the instruction for higher licenses.

All courses at the "D.V.S." are directed toward the obtaining of pilot's licenses of either "A," "B," or "C" grade. "A" license is for machines up to 2,000 lb. gross weight and is limited to private flying. License "B" is for airplanes up to 5,500 lb. gross weight and night

in sail to commercial in some ways to the American Limited Commercial License except that the pilot may fly passengers in traffic with machines of this weight. The "C" license is for planes over 5,500 lb. gross weight and can be compared with the American Transport License since it is the highest license and it allows one to fly passengers in traffic with heavy airplanes. In addition, there are intermediate or limited licenses for each class to permit a student of one class to take training in planes of the next higher class.

How serious is the "D.V.S." in Braunschweig, in west Germany. Here more than 1,000 applications for flying instructions are received each year. To each of the applicants papers are sent outlining the courses and stating the prerequisites for entering. There are three main categories of entrance requirements. Under the first category (candidates for transport "C" license), the student must be a high school graduate and have the same credentials as required for entrance in a university. He must also have a speaking knowledge of English, though men Spanish is being accepted as an alternative. It is believed that the great majority of the future will go to English and probably Spanish speaking countries.

The secondary category includes men with chiefly a mechanical education. They must first go to the "D.V.S." aviation school and then pass a special examination at Braunschweig. This examination is somewhat easier than that required to be the first requirement under category one. Though it is considered an advantage to know English or Spanish, a language is not required. These men are only eligible for "B" license and therefore their flying training takes only two years. These men receive free room and board and in addition 12 marks a week. To continue with schooling most men under category two must borrow money which they return after they have completed their instruction and are working. The last category is made up of a group which includes aircraft engineers, master engineers, and lawyers specializing in aeronautics. They take a one-year course to

quidity flights for "A" license and the intermediate "B" for the final "C." In theory they must fly 3000 miles and 100 hours plus "C" studies. Besides the "A" license, there is an addition to the above, the "D.V.S.," prepared for "B" license the air not police which are stationed at every flying field in Germany. For the Luft Hansa and other traffic companies, they also train for "B" license a number of radio men, mechanics, etc., who will later fly in traffic on these airlines. Besides these, a number of ground maintenance and radio men are also given instruction.

Typically all students must pass an athletic examination before proceeding themselves at the school. Athletic examinations are standardized over all Germany and are divided into three classes, bronze, silver and gold. The first, that for the bronze medal, is the most difficult and is required for all students up to 30 years old. Above 30 they may take the examination for the silver medal and above 40 they take the gold. The age range for flying students is 18 to 35.

If they successfully pass all of the above, the candidates go to Berlin to take another physical examination under Dr. Kessel, a pilot, who shows exercises all candidates must do. Above 30 years old the candidates pass this physical examination. Then the next are subjected to a psychological examination to determine their suitability to become an airplane pilot; this again demands about 10 per cent out of the applicants.

From the 300 to 1000 applicants only one per category can pass 100 exams to proceed themselves at Braunschweig for an interview. After the interview and physical examination about 20 to 30 students go to the school at Braunschweig in the middle of March to begin the course. During this time the school authorities are given a last opportunity to become acquainted with the students. The first few weeks are devoted chiefly to athletics and some work around the planes. The men are each taken up for a few flights by two of the most experienced instructors who must report on the reactions of every student. After about four weeks most of the students are sent away and only about 25 remain to continue the course.

In the middle of April these 25 go to Norsthal in Heligoland on the Sea. This is an island on the Heligoland. They remain there for about six months undergoing a complete physical training. They are divided into three groups and at the same time studying the fundamentals of radio and navigation. They do not fly, but spend most of their time on the water in small boats and later make two or three long trips of some weeks in larger motor launches. They visit Denmark, Norway, Sweden, Denmark and Poland. All of this time they live quite the same as sailors. Toward the end of September they take their examinations and though most usually pass, occasionally one or two drop out. This examination is about the same as for civilian maritime pilots.

In the beginning of October the men go back to Braunschweig and begin their first flight training. They remain there about six months during which they spend some three months in the shops and three more months in receiving instruction on land machines. This prepares them for "A" license which corresponds to our private pilot's license. At the same time the students study theoretical ground course under the direction of a special engineering instructor in addition to their other teachers. This includes airplane theory, engine theory, meteorology, navigation with instruments (map making, dead reckon-

ing, etc., as celestial navigation at this time) and air law and regulations. The men get about 30 hr. flying time before taking the "A" license. This examination is a cross-country of three, one landing in a space 5500 yd. without refueling outside of this area. The crossfield must climb to 5000 ft. and stay there one hour and must also make two small cross-country trips of 100 km. (63 mi.) and then a final cross-country trip of 300 km. (190 mi.) On this last cross-country trip the student must make two landings at fifty kilometers in time but marked on a map given to him just before he starts. An official is at each field to certify the landing. It is required to make a dead stick landing from 3000 ft. over the field and land on the field without using the throttle. The student must also fly over the field at 100 ft. and also a Vee point to start from the ground he must close the throttle and make a spot landing in the same area as mentioned above. This instruction is given chiefly to prepare the student in case of engine failure. This course naturally is made with Fieseler biplanes powered with Siemens engine.

About the first of April, about seven 12 months of training, the students begin on a 5000-km. (3100-mi.) cross-country solo flight to suppose their first solo flight of Germany. At the end of the first year, they usually mean visiting engine theory and engine theory and about 50 hr. flying time and takes about two months. The main cross-country trip is planned to include all kinds of weather and flying conditions.

Toward the end of May or the beginning of June the group goes to Warnemünde for seaplane training under the direction of Mr. Hoyer. Warnemünde is located on the Baltic and is fortunate in having a good sand island lake separated from the sea by a strip of land on which is the flying school, the flying field and the factory of the Fieseler works for seaplane training. Warnemünde is the only German seaplane base with a concrete runway to the open sea enabling its pilots to fly in the water time when the island lake is frozen. The Fieseler works supply most of the supplies for the use of the school.

To enter seaplane training in the final 100-26 weeks first biplanes powered with B.M.W. IV—250hp engines. After about 20 flights with an instructor the student makes about 30 solo flights before getting for an "A" license to a seaplane pilot. The first flight is made on the first solo flight, the student is in the air, authorized by five lamps flying in the direction of the land and covering about 250 yd. The student must fly over the bays at 1500 ft. and out his gas and land along into the bays more than 30 yd. away. The plane has a normal landing gear. Warnemünde is the only place allowed so this, three of which must be in this area. He must then make three landings in the open sea in a sea between "two and three." This corresponds to a wind velocity of about 18 m.p.h. Each time the student must see his engine stop a sea anchor, start the engine and take off. To complete the requirements for the "A" license requirements he must also make a 100-km. seaplane flight with two landings at specified places. In all, the student must have about 100 flights at 15 hr. flying plus 100 flights for this license which might be compared to the private license for landplanes.

After the student has completed the requirements for the "A" license, about seven or eight of the best students are selected to become seaplane pilots while the others return to Braunschweig for a corresponding course with land machines. The two courses are quite similar

but, as the seaplane course requires a more varied study, the latter will be described.

Those men, who are selected to remain in Warnemünde receive with their final 100-26 weeks preparing for their "B" license. It seems that in taking the various flying examinations in Germany the pilot undergoes a certain amount of very useful training. For an intermediate "B" license a pilot must make three landings in land water and then in a sea of about "three to four" corresponding to a wind of about 22 m.p.h. He must also maneuver the plane when tamed by a steamer in this sea heavy sea. To complete the requirements he must make an overseas flight of 300 miles landing at two specified places and returning to his home in about 10 hours of the start. The student then obtains a limited "B" license which enables him to begin a series of overseas flights in "B" planes in which last the rest of the summer. These trips take them all over the Baltic, to ports in Norway, Denmark, Sweden, Dusseldorf and naturally, numerous places on the northern coast of Germany. During the summer, the students fly whenever the weather is good and in bad days continue with their ground training in radio, navigation (not celestial) and engine theory. Later the student must make two night landings in restricted areas marked off by lighted buoys and in addition he must fly one hour at night.

Between an October the men leave Warnemünde for a winter cruise on the German merchant marine trading ship "Desander" class. There are usually about 200 merchant marine cadets on board and with them are about seven men from the "D.V.S." It seems that pilots do not like this cruise as they are treated like sailors the same as are the normal sailors. This cruise, for the last few years has been going to South America returning in February when the students are allowed their first extended leave of absence in two years. This leave is usually about four weeks after which the men go to live on the Isle of Selt in the North Sea. They stay there for the summer to take advanced training on Fieseler HLE 5 trim trim flying with standard and B.M.W. 550hp engines. During this summer they cover about 6000 miles in the North Sea where, navigation and maneuvering is more difficult than in the Baltic. They make weekly trips to the Dutch Islands, England and Norway, and at the same time receive instruction in navigation and radio for long flights. At the end of the summer they must pass an examination in partial blind flying. From late May of the men go to the Luft Hansa as second pilots where they fly for about four to six weeks covering some 6000 mi. in traffic.

At the end of the summer the seaplane students return to Warnemünde for spend course in radio, meteorology, engine theory, seaplane theory and navigation preparing them for the advanced portion of the examination for the final "B" license. During this time the students fly only about two afternoon trips with no cross-country course. In addition as the course is theoretical navigation the students must navigate out of the 60-ft. dock of the school between two specified points in thick weather. Later they make six round trips on the steamer, going from Warnemünde in Denmark. The students first make the trip in daylight, steering the boat into the supervision of one of the school instructors who accompanies them. Later they make trips at night navigating by celestial observation or in thick weather with the radio direction finder. The boats are fitted with a mechanical recording steering

mechanism which shows quite well the course taken by the students. The purpose of these trips is to first let the student navigate on board ship where it is not so difficult as in flight. After the students get more advanced they make ocean flights in the Masted HLE 9 and Masted HLE 10 twin float low wing sea planes which are motorized machines fitted with radio directional finders, etc. These are fast planes powered with 8.3 H.P. VI 600hp engines.

Toward the end of the winter, the students complete their theoretical course and leave home flying time for their final "B" license. However, first they must pass an examination in navigation similar to that given for a seaman's license which shows that there are additional requirements to flying. They must also pass a second-class radio examination given by the Radio Ministry Department. This calls for some 80 letters per minute in closed text and 100 in open text. In addition they have examinations in aerodynamics, engines and meteorology.

After completing these examinations, the student returns to Berlin to prepare for a "C" license. Here, he gets flying time with Dornier flying boats and Hinfied and Heinkel seaplanes. The men must get in about 6000 in 5000 mi. of sea flying, and also properly make six visits trips to Sweden and Norway. They must also get enough flying time the previous summer so as second pilots to the Luft Hansa and occasionally the students make long trips over the North Sea in Dornier Wals or Super Wals or three-engined Junkers G 24 machines on cruises. On these flights the student makes his colonial observations and operates the radio apparatus alone but usually carries an instructor as passenger. Last year Director Von Gronow of the "D.V.S." took five students with him on a Dornier Wal on a trip to the Faroes, a Danish island north of England and from there they flew to Iceland.

Sometimes, during this last summer most of the students begin looking for positions and if they obtain a position before the end of the summer they are allowed to leave the school and fly "B" machines in traffic until they receive a total of 6000 hours of flying time required for the final "C" license. After this, the students return to Warnemünde for the last winter during which they take additional theoretical courses that are required for "C" license. After they have completed radio, meteorology, engine theory and navigation, they take the large multi-engined planes they receive their "C" license and finally go as land pilots for the Luft Hansa to get some airland for a year or two before carrying passengers over sea. Of course many of the men go directly into the service of other contracting firms, such as Scottish in South America, and then fly seaplanes in traffic, or else.

It is interesting to note the losses incurred during flying instruction. There have been no fatal losses in seaplanes since 1922. The only fatal accident was once a student was struck by a propeller. Each year there have been a few minor accidents on the ground and those due to forced landings and sometimes lost landings. It has been stated that plane losses are more expensive with seaplanes than land machines, because of the fact that a landing error means total destruction and this expense means the plane is a total loss. There is about one total seaplane loss in every 600 flying hours and one landplane loss in every 2000 hours. However, the percentage of small and minor accidents is much more with land seaplanes.



The Libre et Rapide on the deck of the ship on the Atlantic Ocean.

By CHARLES H. GALE
Assistant Editor of Aviation

EARLY in the morning of its last day, it was on the heavy seas, the shipwreck of the North German Lloyd Line, which from its sea deck, a stout little seaplane, lifted with a puff. This machine speeds ahead of the shipwreck, and lands in the harbor hours before the Bremen's arrival. This ship-to-shore service, showing various elements of the year, operates as a regular integral part of the world transportation system.

Although this ship-to-shore system is not a new idea, it remained for two European shipwreck lines to actually adopt it. The French Line made a base with its experimental operation in the summer of 1928, and both the French Line and the North German Lloyd put it on an established basis, quite free from the aspects of an experiment, during the summer and fall of 1929. The latter resumed service in April this year while the French Line has not abandoned its plan. Additional credit goes to the North German Lloyd since it caused the shipwrecking equipment to be built into its newest shipwrecks, the Bremen and the Europa, as a standard item of construction. This meant that the airplane had definitely penetrated the marine world, and when the shipwrecking elements were known to keep abreast of the modern trends, and profit by the particular advantages offered by aircraft.

Practical ship-to-shore flying has been possible through the use of the catapult, a device long employed in naval armaments. The catapult scheme owes its favor, as far as commercial operations are concerned, to the

fact that the cost involved is much less than some other methods would be. It has been greatly reduced through the policy of using seaplanes as flying boats, by concentration on land airports alone. The safety factor is increased by virtue of the vast amount of experience accumulated through years of naval catapulting. In fact, most types of planes are those being used in the present commercial service, and naval-trained pilots are their operators.

Both the French Line and the North German Lloyd report complete satisfaction with this catapult method. So satisfactory have their experiences been, that future plans for construction of major vessels for both lines include deck provisions for ship-to-shore services by means of the catapult. This applies also to the United States Line, and others are known to be watching the operation carefully with the intention of adopting the idea when they themselves become fully sold on the project. Just as some of the larger naval vessels are complete without airplane and catapult equipment, so it appears that before long an ordinary commercial shipwreck will be complete in commercial installation.

IN the air transport operators in this country, the shipwrecking lines are preferring to concentrate on mail and freight in the early stages. They anticipate that it will be some time before ship-to-shore accommodations are provided for passengers, although this are intended as the passenger angle. Suitable aircraft and handling methods must be developed first of all.

Owing to the fact that the catapulting method is not new, the main cause for the operations of the ship-to-shore service seems to lie in the development of a sufficient demand for such a service. If there had been, in other words, a demand for the service five or six years ago, catapulting probably would have been installed without much hesitancy on the part of the ship owners. While

Ship to AIR Shore MAIL SERVICE

*An Account of Early
tion by the French*

*Experiments and Present Day Opera-
Line and the North German Lloyd*



The Bremen's plane is hoisted aboard after some portion of a mail night.

the obvious three-deck air storage has long been generally acknowledged, the sufficiently extensive demand for such a service has rather tardily followed the spontaneous development of the air mail boats on overhead tracks.

Since this means to carry away an old method for a new purpose, what lowers the two companies have learned include for the most part only general points such as the necessity of suitable equipment throughout, faster planes, increased cruising range, ample cargo capacity, more frequent schedules, reliable weather reporting service, efficient radio communication between planes and control stations, and sanitation of the aircraft in the face of the construction of the shipwreck, so that every detail may be adequately provided for, rather than having to

put up with an installation called as an afterthought.

However, one notable improvement to be incorporated in the plane designed for the Bremen's plans. This latter was arranged with seats in tandem for the new machine is to have seats placed side-by-side to facilitate communication between the pilot and his cabin-to-cabin operator during periods of intense navigation and for radio communication.

Such an arrangement was suggested last year at the time the Bremen's mail plane was expected to fly into Boston as an effort to accommodate Boston interests seeking to test the feasibility of making that harbor a regular port of call for the plane. Pilot John von Neuhoff met his



The Bremen's mail plane is hoisted on the ship's deck to position for a landing.

near land and was unable to find his way through it to his destination.

Finally, there remained another to do but to attempt a return to the Bremen, which was not radio signals and kept the plane's crew in the dark of the direction in which it should fly. With pilot and navigator in separate cockpit, navigation was rather awkward.

AIR CHIEFS have been made this year in the plane and the method of handling it on the ship. Larger trails had been installed to give the plane a range of about 8 hr flying instead of but 6 hr. This permits taking off from the steamship track further than land than previously. It is expected the plane may be launched between 400-600 mi. at sea during this season instead of about 300 mi. out.

Instead of parking the plane on the catwalk from the front of departure from port until the time of take-off the practice now is to place it on the deck itself behind a special steel screen which has been erected. This position is convenient under worst-weather, as the machine was subjected to some real stress which, posed on the catwalk in the face of the ocean winds. A bridge-like track has been built by which the plane may be transferred from the deck to the catwalk and vice versa. This year the operation of the Bremen ship-to-shore service is under the Luft Hanse. This means that the well-known Germania air transport company has direct charges of operations by arrangement with the steamship people. Last year the North German Lloyd handled the plane and crew and handled the operations itself. The present method is believed to be superior.

As in any form of transportation, the value of the ship-to-shore service will increase with its frequency. Either the Bremen or the Europa leaves port on either side of the Atlantic about every week. As soon as the ships are equipped with radio sets (now in July) there will be available a weekly ship-to-shore service by that one company. This will matter placed on board one of the ships for departure on a Monday morning would reach Germany on a Friday or Saturday. Mail placed on board one of the ships at Bremen at midnight on Sunday (for the west-bound trip) would reach New York City the next Saturday.

Operation costs are not available from either company except that it is known the Bremen plane would be operating on a pay-as-you-go basis carrying a load of about 250 lb. mail on each trip. The Europa is carrying a gross income less the mail of about \$1,300 per trip. On the first trip of 1930, the plane carried about 300 lb. Unluckily it does not pay for itself but it is being carried on in the same spirit which has attended all passenger air mail services. The term of expense includes the salaries of pilot, radio and navigating assistant mechanics, and cost of repairs and fuel for the flights. These flights occur only a few times each month, of course. Both the German and French companies have assumed that the service is worth-while.

It would be hard under conditions with the French and German governments. The United States government has no contact directly with the steamship company but has an agreement with each of the governments involved. The Postal Administration of Germany has paid \$100 (about \$110) per trip to the Bremen, about 240 lb. gross weight. This payment includes forward forwarding of the mail matter by co-ordinating German airlines.

Payments to the French postal authorities are as fol-

lows: (1) Letters and post cards, up to 10 g. (about 0.15 oz.) 30 French francs (about \$9.90). For each 0.17 g. above the first 0.15 oz., \$0.91. (2) Other articles, per 1.75 g., \$0.19. These rates do not include express (forwarding) French mail.

The fee to the public in this country for the use of the file de France ship-to-shore service last year was as follows: \$0.60 for each full ounce or fraction to the rate of letters and post cards and \$0.25 for each 2 oz. or fraction thereof in the case of other articles. This air mail fee is in addition to regular postage. For the Bremen service, there is a charge of \$0.20 for each letter not exceeding 1/2 oz., \$0.35 for each letter exceeding 1/2 up to 1 oz., and so on in proportion (\$0.15 being added at an air rate for each additional 1/2 oz. and \$0.05 being added as postage for each additional ounce). The total charge for a post card is \$0.16 (\$0.15 air mail fee plus \$0.01 regular postage). Such air mail will be forwarded by air to Germany.

The French Line in 1928 introduced the first airship ship-to-shore service on a regular scheduled basis. A Loire d'Officier flying boat was used with Leo Donaghy as pilot. The catwalk was the St. Maurice type—a fixed track built into the deck and dependent entirely on the direction of the steamship for launching direction. Several landings were made on both sides of the Atlantic and the company expressed satisfaction with the system. On one of the outboard ships, however, the plane was forced to land at sea because of engine trouble. The lessons of the season and the desire for additional technical study of the service caused the company to abandon this service for that year.

The first to get under way last year was the Bremen service. This ship may be considered to have introduced in the permanent use of the method since it was built with such a service definitely in mind. The catwalk is of some standard equipment and the launch and recovery is of a type for that particular ship was installed. Thus, the catwalk became free of an experiment added as an after thought and assumed the aspect of a device to be definitely installed with.

THE SHIPBOARD and catwalk made are Hordell products, described in AVIATION, Aug. 8, 1929. This catwalk has the advantage of not being dependent on the steam ship direction for launching. The track is mounted on a movable which may be swung to the desired direction without changing the ship's course to any appreciable degree. Thus, the Bremen may steam at practically undisturbed speed while the launching operation occurs. The file de France, on the other hand, is forced by the third type of track to make a serious loss of the launching practice, involving change in direction and speed.

The third thing last year was to launch the Bremen plane about 300 mi. east of New York, on the westward trip. The time of launching and distance from the shore depend upon the position of the steamship, the amount of time before daylight and the weather. Since it is a airplane without the assistance of a flying boat hull it has the rather high cruising speed of between 110 and 115 m.p.h., enabling the plane to reach New York harbor in a comparatively short time. This represents an average of about a half \$100 per trip to the Bremen.

In the light of the experience of the plane crew last season it is expected Boston will not be used as the American terminal. Fog is much more prevalent in that area than around New York Harbor. Thoroughly



The catwalk launch area of the Bremen. Note the catwalk in the middle of the plane, just forward of the main deck.

Bremen would be a desirable port for the plane since the mail could be loaded there earlier than could the most favorable conditions with New York as the destination.

As further examples of the interest which the North German Lloyd Company is taking in this ship-to-shore service, it should be mentioned that its steamer boat landfall mail at Galveston, Texas, to be done in London and thence to Germany. This seems to have been quite satisfactory. There then is the experience with the Keweenaw attachment, whereby the airplane may be landed in the water of a steamship, and issued to a certain landing stage located at the steamer's stern. This has been devised to prevent contacts between steamship and plane, without making it necessary for the former to slow down. The plane is towed to the landing stage and maneuvered upon it by a landing party on the ship. Mail may be transferred to and from the plane, which is then cut loose and either dropping behind, takes off. It is understood that this may be installed in some of the slower ships owned by the company, such as those used in the North American trade. The device has been found unsatisfactory for the faster vessels.

Not long after the Bremen began operations, in 1929, the French Line resumed its plane service. A C.A.M.S. flying boat was used on the file de France that year, and was reported to have given better satisfaction than the Loire d'Officier. It was operated by the Omniparc Transatlantique Aeronautique, a subsidiary of the French Line, functioning as a separate unit. The file de France is the only one of the line equipped with a catwalk and none of the present fleet will be so equipped because of the large amount of equipment which would be necessary. However, like the North German Lloyd, the French Line has great faith in the service and its new larger boats will incorporate catwalks as permanent features. Both companies agree that the installation of catwalks should be made during the construction of the steamships.

The C.A.M.S. was powered with a Lombard-Turbin 250-hp. water-cooled engine. The engine had had wings were mentioned to withstand the shock of catapulting. Two persons were carried, M. Donaghy the pilot, and Laurent Collette, the radio operator and navigator. The machine is of below construction, and its wings fold so that it can be stored on the steaming without taking up much room. The plane has a capacity of about 230 lb. of mail, but only between 45 and 55 lb. were

carried on each trip. The company hopes to have a larger and lower plane available this year, if and when service is resumed. The catwalk is about 64 ft. long. Two mechanics stationed on the steamship look after the plane and there is, in addition, a manager of the ship-to-shore service, who travels with the record on the ship.

Shores have been loaded upon with considerable failure by the French Line as an American terminal, and it has been tried on several times. The plane is usually launched about 100 mi. from shore, although on occasion it has been launched about 325 mi. out. On the European side the plane is loaded in the Seine at a point about 3 mi. from the Paris Port Office. The French postal authorities meet the plane and reach the mail to the post office for sorting. A regular ship-to-shore service, the reverse of the present procedure has not as yet been started at either line.

One of the fundamental conditions of successful operation of the ship-to-shore service on both the Bremen and the file de France is accurate weather reporting. The crewmen try to notify the weather bureau at either terminal of the probable time of launching the plane and the following day, before the plane takes off, the shore weather bureau gives a report of the conditions to be expected over the course flown. This service has been of great assistance. Radio equipment is carried by each plane.

Some interesting experiments in this ship-to-shore scheme have been carried out since 1929, at the Lorient airport, notably the United States Navy. No aeronautical activity is being carried on by this line at the present time, in spite of its various experiments, but its officials have stated repeatedly their belief in the value of co-ordinating air transportation with steamship travel, and it is expected that the line will enter on extensive aeronautical activities in the future.

Among the things which this line has sponsored was the flight, October 1929, made from the Levantien to the United States by the French Line. As a result of this experiment, Mr. Chamberlain recommended that a catwalk installation would be more practicable. Early in 1929 the company experimented with the Loire d'Officier Mail Delivery Center, again on board the Levantien. Several successful transfers of mail were made with this, but it has not been adopted for regular use.

In May, 1928, the Army Ship TC-5 contacted with the steamship American Trader of the United States Line. A representative of the company was transferred from the steamer to the ship and back to the latter. This, the company claims, is the first time an airplane was ever taken to take a passenger boat at sea.

The United has had associated mail with air transportation only in the extent of arranging for planes to meet the passengers on request, at either American or European terminals. The company, however, is watching the progress being made with the catwalk of mail, and reports that, as soon as it is converted the time is ripe to introduce these arrangements on board United States steamships, the necessary stage will be added.

It is interesting to note that the Coast Line, of Italy, made one of the earliest experiments with the ship-to-shore scheme. Several years ago it was arranged to send mail by plane, from one of the company's ships to the steamship at the port of Genoa. The project later was abandoned, however, when it was decided that the expense did not justify the benefits derived.

Economics AND THE AIRCRAFT

Discussed Along with Design, Engines, Production and Aerodynamics

By HENRY O. PATTERSON, JR.
Assistant Editor of AVIATION

ONE OF the best balanced technical programs which the aircraft industry has undertaken was presented by the American Society of Mechanical Engineers, Aerospace Division, at Dayton, Ohio, from May 19 to 22. Touching on practically every phase of aircraft, from design to operation, the papers read proved interesting both in subject matter and the discussion which they evoked.

Each paper was well presented and well received. The attendance was phenomenal, too, on the first morning due to adverse rains which prevented many from arriving on time. However, the attendance at all of the sessions was far above that of the New York Show meetings. The laboratories and facilities of Wright Field were thrown open for inspection, regular tours being arranged each morning and afternoon. It is believed that there was probably more cooperation at Dayton between the Army and civilians than at any other similar meeting. The Dayton meetings were opened by C. H. Riech, chairman of the Dayton Session A.S.M.E., Maj. J. R. Puckett of Wright Field gave the address of welcome. Orville Wright was introduced and acted in the capacity of honorary chairman of the session.

The first paper, by Hug V. Wagner of the Siemens-Brennan Publishing Co., was entitled "What the Airplane Can Do in Central and South America." This paper went into the details of all transportation systems existing in Central and South America, comparing them with air routes, both in operation and proposed. Mr. Wagner believed that the southern countries, with their cheap transportation facilities, offered great opportunities for airlines. They must, however, be handled diplomatically since the United States is not formally looked upon in these quarters.

Carl B. Friddle, president of the Airship Development Corp., Detroit, read the second paper of Monday morning. He compared and illustrated by means of large diagrams, the cost of constructing, operating, and the field of use of the rigid airship.

Monday afternoon the entire gathering assembled at Wright Field and four papers on Aircraft Production were read.

The wide difference between commercial industry and the military run, discussed in a paper by Rex B. Bessel



Rex B. Bessel, chairman of a panel considering military and commercial manufacturing.



Rex B. Bessel, chairman of a panel considering military and commercial manufacturing.

entitled "Vigilant Design, Manufacturing and Sales. Commercial vs. Military." The major point of this paper was that the manufacturer of present day commercial planes must find it much more difficult to enter the military manufacturing field than the manufacturer of military craft to enter commercial aviation. Mr. Bessel was of the opinion that there are fundamental differences in design which tend to prove this point.

The commercial manufacturer designs his planes primarily to carry a pay load. The military manufacturer, on the other hand, designs his planes to carry a gross amount of armament, to be maneuverable and to have a specified performance. A good designer of military aircraft fails to merely part of the day's work to add an amphibious gear to an existing type, or create some other piece of design.

Another point brought out by this paper was the

INDUSTRY

at Dayton Session of A.S.M.E.

fact that the manufacturer building planes commercially is not subject to government inspection.

On the other hand, there are many points in favor of the commercial manufacturer. He is not tied down to definite delivery dates. Those who are subject to government contracts must give a definite bid and follow this to the completion of the work. If the plans appear to be costing more than at first indicated, the manufacturer usually goes ahead at a great loss and completes them in a satisfactory manner, hoping to obtain a larger government contract for the same type of plane later and thus make up the loss. Quite frequently the larger contract is not forthcoming, leaving the manufacturer on the verge of bankruptcy. Mr. Bessel made a point of the fact that the present situation is not confined to the production of the last types of military aircraft.

A complete discussion on past and present production facilities of the Alexander Aircraft plant was the background of a paper by J. Don Alexander of Colorado Springs, Colo. His paper, entitled "Reduction of Airplane Production Costs," agreed with the statement that rigid and uniform production is the key word of the present day aircraft industry. Manufacturing economies will not be effective until the yearly output reaches five or six figures.

At the present time, it is quite possible to effect economies by the proper application of efficient factory planning, good machinery, and labor saving devices. Mr. Alexander illustrated his remarks with half a dozen examples in which the Alexander Company had been able to lower its costs greatly.

Every manufacturing plant should encourage its workers to develop new methods by which they may do their work more. This activity can be stimulated by offering cash prizes each month for practical ideas. The closing idea of this paper was that plans must be developed which are faster and more economical to operate if the great saving problem is to be reached. The only way that the initial cost to the buyer may be lowered is by a careful and steady reduction of production costs.

The third paper of the afternoon was the "Design and Manufacture of Airplane from the Point of View of Low Production Costs," by Russell F. Horley of the Waco Company.

Experience gained in the automotive industry has



Cost of the Robert Williams and Orville Wright awards and award of honor presented at the A.S.M.E. Dayton sessions.

wound the aircraft companies millions of dollars. Mr. Horley believes. Only close cooperation between the design and production departments will a good finished product result. The plane must not only be well designed aerodynamically but must be planned in general proportion to the type.

The essential factors contributing to low production cost are an acceptable design which may be easily placed in quantity production, efficient production methods, efficient production methods include well-trained personnel and good equipment, with a properly designed factory.

"Production Methods in Airplane Construction," by R. S. Dawson of the Curtiss-Wright Corporation was the final paper of the afternoon. The paper stressed the fact that quantity production was usually a relative term and present airplane production in an aircraft factory is a very low figure. When real quantity production begins we may expect drastic price reductions, but not until many more planes per week are being built than at present.

Mr. Dawson cited several problems which arise in quantity production and discussed how they might be avoided in the aircraft industry.

MONDAY EVENING: Capt. A. W. Stevens gave a very interesting talk, telling of the advances made by the use of aerial photography. He illustrated his remarks by several lantern slides of aerial photographs taken by him from high altitudes.

Airplane design was the chief topic of the discussion on Tuesday morning. At this time a group of three papers were read, each giving practical details which might be of help to an aircraft organization.

The first of the three papers was entitled "German Metal Airplane Construction," and was prepared by Prof. Herbert Wagner of the Technical High School, Dusseldorf, Germany. The paper was presented by J. Otto Schenck of the Junkers Corp. of America. The Wagner paper was a very detailed study of the present types and innovations of German metal plane construction.

In many ways the German construction is quite different from that employed in America. The newer tendency of Americans to use a monocoque metal con-

struction has not involved much more in Germany. One of the main points of this paper is a comparison of methods devised of failure and repair of wings.

A. E. Blawie, read the discussion which had been prepared by Col. W. C. Clark. He stated that there had been great advance made in aerial maintenance construction in this country, but that considerable improvements were also in adopting it. Captain George, of Wright Field, stated that the Army is conducting more tests on metal shearing and investigations of corrosion are being made.

Richard M. Mack next gave a paper entitled "Airplane Wing Training." His opening statement was that, of all the possible methods used in airplane design, the training of wings was the most exploited. Mr. Mack then went into great detail and explained all of the wing training systems which are in use in existence. This paper was very well presented and proved to be the result of much detailed study by the author. Several points were shown by means of which the statements may could be reduced. Efficiency of wing training is entirely a matter of the plane. No definite rules may be set down by which the designer may select one wing system from another, but rather it must depend entirely upon the type, size and use of the plane being designed.

The third paper of the morning, "Engineering Organization in the Airplane Factory," was read by E. J. Hickey of the Keystone Aircraft Corp. Such a paper is very timely with so much reorganization going on in the industry. Mr. Hickey described in detail the workings of the Keystone plant in a case of Curtiss-Wright. For the manufacturer of aircraft, an accessories factory, much to be learned is in this paper. Accompanying it were two charts showing the exact relationship between the various departments of a manufacturing group such as Curtiss-Wright.

A. A. Gasser of the Fokker Corporation, stated that the system of an organization for each separate part of the design was best. With the executive system now employed in some factories, freedom is continuously arising.

In the afternoon the last paper covered the studies to Wright Field when two interesting and interesting programs were arranged. One of these, "The Fuel and Lubrication System," was held in the Auditorium while the Aerodynamic Section was held in the Main Hall, Building "A." The High Performance Gasoline Aircraft Program and the Fuel and Oil problems" by S. D. Horro, of Wright Field, and "Some Aspects of Aircraft Lubrication" by B. E. Shiley, Continental Oil Company, Denver, Colo. were the first two papers. They were devoted entirely to a discussion of advances made toward obtaining better fuel and oil consumption. Due to Mr. Shiley's discussion his paper was presented by L. L. Kiers, Chief of Research, Continental Oil Co. Attention was paid to engines running better than the present day standard.



Carl B. Fisher, who presented the paper on the fuel and oil system.

The final paper of the final session was "The Progress Status of Superchargers for Aviation Engines," by Dr. Norbert A. Moss of the General Electric Company. His paper started with a technical history of supercharging and outlined that development to its present standing. In the Aerodynamic Section the first paper read was entitled "Practical Airplane Performance Calculations," and was delivered by Dr. Michael Winter of the Chino, Vought Corp. This paper explained a new method of calculating performance based on data secured from wind tunnel experiments. If any plane is to succeed in speed work the specifications originally called for. Dr. Winter's formulas give a new and simpler method of calculating the speed and other characteristics. This new method is based on the evaluation of parasitic resistance and in-flight characteristics of the engine and propeller.

Due to illness of Lieut. Carl B. Harper his paper was withdrawn for a future date. Next on the program was "The Airplane With Minimum Loss of Energy," by Prof. Franco Prandtl of Pisa, Italy. Professor Prandtl's paper was considered the most authoritative in the Dayton session. He derived and developed formulae which, when the proper substitutions were made, give the correct design characteristics of propellers.

WHEREABOUTS TURNING the problems of slowing the airplane and protecting it from fire were treated in High L. Dryden, of the Bureau of Standards, and Lieut. George C. C. McLeod of the Naval Aircraft Factory respectively. As to slowing, Mr. Dryden stated that so one device may be developed which, with a slight sacrifice of weight, will completely slow an airplane. All successful aircraft makers work by slowing down the engine power. When the engine explosion takes its toll, the result will require a considerable amount of fuel. The popular saying for a large amount of this, either the moving parts of the engine such as pistons, valves and valves and generally. With the general assumption in that most propellers are never then broken and this may be accounted for by the fact that most propellers are inevitably run at a higher tip speed. The shaft, propeller and engine always move more than one of a thicker section.

In the discussion on Dr. Dryden's paper it was said that since not only is propulsion but comes both mental and physical phenomena. While the airplane is risky, it does not have to become suddenly altered to be improved to reduced standards. It was thought that, on the average, most in-captain planes must operate than single engine ones. This is due to the large amount of stress put throughout the fuselage which is based on a single-engine plane.

In his talk on fire protection, Commander McCand gave a few general principles and showed the trend of investigations which have been conducted, both for fire prevention and fire extinguishing. At present there are no satisfactory fire extinguishers for use on aircraft. Investigation is therefore of vital importance. A great deal of experimental work is being carried on by the government and the engine manufacturers, and it is to be hoped that soon much progress will be shown in fire fighting equipment.

There is no limit upon which a code might be laid down regarding the amount of equipment to be used on military or commercial planes. Most fires start in the

engine compartment and it is there that the most protection must be conferred. It is seldom, of course, that the engine itself, by means of exhaust gases, etc., causes a fire. Broken fuel systems, and for serious or electrical discharges, are the usual cause of fire. The Commander's paper must also detail and describe all the various fire systems now in use. In addition, he explained the more satisfactory methods of fuel system arrangement which would prevent leakage or leaky lines.

IN THE AFTERNOON the setting was again transferred to Wright Field for the reading of two papers on light alloys for aircraft. The first paper entitled "Some Characteristics of Light Alloys for Aircraft" by H. W. Galt of Columbus, Ohio, a good discussion was given on the subject of the alloys which may be expected in future years. One of the main points of this paper is that the aircraft industry is greatly dependent upon the progress made in metallurgy. Only as the science of metallurgy progresses can the aeronautical industry advance. Of all the metals, beryllium shows the most promise. While it is extremely expensive at the present time, it will become reasonable in price as soon as proper methods of obtaining it are developed. There is no security of beryllium as yet. It is also probable that the process of putting a protective coating on beryllium and other forms of aircraft metal to prevent corrosion will become an accepted practice.

The second paper of the afternoon, which was received and read by Lieut. A. J. Lynn of Wright Field, was a very interesting lecture on some series of aluminum alloys including their methods of manufacture and their strength at high temperatures.

WHEREABOUTS TURNING the Bakers Hotel was the scene of the A.S.M.E. National Aeronautical Banquet. Speeches at this dinner were given from the airplane engineers and other guests on their first flight. Each paper, in the evening, was the subject of a guest of honor, Mr. Orville Wright. Talks were given by Sir Hubert Wilton and C. S. "Coney" Jones. In his talk Sir Hubert Wilton stressed the great aid made accessible to the explorer in the field of aeronautics. He stated that it is now possible to survey and map a month land in one day as it would formerly have been only in a year. "Coney" Jones' speech was one of two formal addresses. He discussed his early days of ballooning and racing flying. In conclusion he stated that the army does not object to its officers entering civilian aviation, for in such pursuits they know where they may again call on them if the need arises. He stressed it, positively the thanks that commercial aviation owes to Wright Field and the army in general for having provided the type of men now in commercial aviation, who have had their training there.

With C. H. Coffin at the chair the Thursday morning Unmanned Section started with a paper "Progress in Instruments for Blind Flying" by Elmer A. Sperry, Jr., of the Sperry Gyroscope Company. The Sperry Gyroscope Co. has recently developed an artificial horizon by means of which the pilot may at all times ascertain his level flight. Mr. Sperry's paper was devoted to a description of that instrument. The instrument works by means of a vertical driver gyroscope, and fluids previously found in the pendulum type of instrument are said to have been eliminated.

The next paper was one of the high points of the A.S.M.E. meeting in Leuch Observance of Berlin, Germany, in his paper "Economics of Airplane Transportation" described some trends governing the aviation industry that are usually found in any one season. He stated that the problem of being in the problem of the internal combustion engine. Operating reliability is the most important factor to be considered in engine design. Echoing again the feeling which was present first at St. Louis, then Detroit, and last a short while ago at New York, he stressed that more attention must be given to the precision for a harmonious design of both the fuselage and engine, so that each may develop their greatest potentials.

There is room also for much research on the transmission of power to distant propellers and the reverse

Below: Rudolf Heide, of the General Electric Co. He opened the discussion of the engine section.



Dr. William H. Bragg presented the paper on the engine section.

power of engines must be increased over that consumed today. There are two ways of increasing the power output. The first is by designing a more efficient engine, and the second, by changing the airplane construction in order that less power may be needed. The two-stroke cycle engine offers great possibilities in the aircraft field.

Regardless of their use, construction, and other features, all airplanes must take off, fly, and land. Of these three, landing is by far the most dangerous. Flying will not otherwise vary the land landing risks are increased with increasing speeds, and also landing resistance. Up to 20 per cent of the structural weight can be used by reducing the size of its landing gear. If engines are placed on the wings, instead of the landing gear and landing (which is employed, the entire structural design of modern aircraft must be changed. Multi-engine planes are not practical unless they merely reduce the number of units in which failure may occur.

Captain Offmann, presented, as a landing aid, the use of a track and which could be rotated into any position. He stated in his paper that the device, in which a plane might be loaded depended also upon the amount of deceleration which the passengers and plane could withstand. The paper was presented by Dr. William K. Knepper, of the Goodyear Aircraft Corp.

CONCLUDING the morning session was a paper entitled "Design and Development of Turbopropeller Engines" by Dr. Hanger, Humphrey Motor Co., Berlin, Germany. The paper was presented in Mr. H. V.

Thomas Vice-President, The Pittsburgh Mail Aircraft Co., Pittsburgh Pa. Dr. Baugher has spent most years in experimenting with and developing large airplanes. His paper was devoted to a description of the engineering features and possible use for a large double ended airplane. The plane specifications of which are given in the separate table below, is to be powered by twelve engines. The propellers, which are in the trailing edge of the wing, are to be driven by long shafts on the engines.

It is hoped that this arrangement will be better aerodynamically than placing the engines on top of the wings. The wings will be of full cantilever type.

One point brought out by Dr. Baugher was that it is impossible to provide with much accuracy the exact characteristics and performance of such a plane. A design error of 5 per cent may affect the pay load as much as 50 per cent. In fact, long distance plane which is working at its maximum L/D may slight variations,

General Specifications of the Proposed
Bristol-Pittsburgh Mail Airplane

Span	200 ft.
Length	120 ft.
Chord	45 ft.
Camber	45 ft. 10 in.
Aspect ratio	10
Wing Surface	20,000 sq. ft.
Wing Load	25 lbs. per sq. ft.
Eng. Area	0.001 sq. ft.

which increase the drag or lower the power, greatly affect the performance.

In the discussion on this paper it was brought out that the airplane and the airplane both have their advantages at the present time. There is much development work going on in an attempt to overcome the faults of each type. It is impossible for anyone just now to predict accurately which will be the ideal carrier for the across large bodies of water. At the present time the airplane built with lighter than air transportation is the loading and handling facilities when the ship arrives at its terminal. The greatest obstacle which faces the designer of large airplanes is that of building them. Designers are faced with the problem of adding large amounts of reserve power to be used in increasing the adhesion of the water to the hull. This greatly cuts down the pay load which could otherwise be possible.

THE FINAL SESSION at Wright Field was held at 2:15 on Thursday afternoon. At this meeting Airways Engineers held the highlight. The first paper was that of Harold Connor of the Allison Engineering Company and was entitled "Trends in Aircraft Engine Development." Mr. Connor's paper included a good discussion of all the present-day aircraft engines. Engine types are greatly influenced by the characteristics of the airplane in which they are to be used. Reviewing the old problems of the air-cooled and liquid-cooled engines the advantages and disadvantages of both types were impartially pointed out.

One of the last points brought in during the entire meeting was in the opening paragraph of Mr. Connor's paper. He stated that every aircraft engine manufacturer firmly believes that his developments are in accord with the correct standards and that his latest product

is the ultimate development of present day engine manufacturing. These beliefs of manufacturers tend to suppress real discussion and greatly retard the development of engines.

The majority of engines built in this country are of the radial air-cooled type. Comparatively little work on research has been done on commercial water-cooled engines. A significant fact, Mr. Connor believes, is that the Europeans have done much to develop the water-cooled engine and at the present time practically all important world's record for speed, duration and distance are held by water-cooled engines. At the present time there is too much conservative ideas of the first cost of an engine. In reality, the first cost means little; development, engineering and servicing costs on engines represent a large percentage of their total cost. It may therefore be expected that engines increasing reliability and performance will do more to lower the ultimate price than cheaper and simpler production methods which do not improve the product.

Next was a paper, "Vibration Characteristics of Airplane Engines Considered," by Prof. Ford L. Prescott of Wright Field. This paper gave some of the most reliable scientific data obtainable at the moment. Prof. Prescott has spent much time in calculating the torsional-vibration characteristics of engines, and gave some of his results in this paper. In obtaining his results, he designed a special instrument which automatically plots torsional displacement against time.

The final paper at Dayton was that entitled "Installation of Air-Cooled Radial Engines" by P. B. Taylor of the Wright Aeronautical Corp. The paper told of the installation problems which might be met with radial air-cooled engines. Many improvements are to be devised, it is quite probable in the near future better cooling will be developed, and the ultimate cooling will probably be one in which the exhaust manifold is incorporated.

The airplane manufacturers and the designers both are at fault as matters now stand, since neither one has seriously studied the installation situation to obtain aerodynamic and engine efficiency. Working as they are now, each one takes the edge off the other product.

Two papers were presented by title only at Dayton. "The Principles and Development of Air Law" by Prof. Andre Henri-Cormier, of Paris, and the "Science of Aerobics" by Leonardo Da Vinci" by Prof. Giovanni, of Rome, will be published at a later date.

IN CONCLUSION it may be stated that the Dayton meetings were more than usually successful. They were well attended by the various members of the industry and discussion on all of the papers was easily obtained. Courtesy to the representatives of the industry at Wright Field respecting trips did not draw especially strong growth. The officers of the field were extremely cordial and every arrangement had been made to properly display the current activities at the field. With Little John in charge, the officers' committee at the field conducted their part of the Dayton meetings much to everyone's satisfaction. Widespread afternoon an exhibition of flying was accorded to the visiting A.S.M.E. members, which was quite apart from the usual flying show. In this particular exhibition the officers demonstrated the methods employed at the field in flight testing a plane. After the test the success of Dayton goes to the officers of Wright Field.

PROBLEMS OF THE *Small Dealer*

Regarding the Methods and Policies to be Adopted by Him in Building Up an Efficient and Profitable Organization

By ROBERT MORRIS BURTT



The Above Flying Service Operates at Columbus, Mo.

I HAD JUST LANDED on my home airport one Friday afternoon from a week's flying around the territory, soliciting and securing new orders for the line of aircrafts that I represented. "Hello, with the prospect of a few hours to look over the accommodation of a week's mail, I entered my office to find that there was a gentleman to see me, so I sat back and waited till the day for that purpose. He introduced himself.

"My name's Jackson. He started, 'from Polish.' "You say I remember having been there about a month ago. I was present at a luncheon when you made some remarks about the future of aviation." (I wondered who I had mistaken or what extraordinary statement I had made.) "I am not here to lay any surprises though I do not say that I won't sometime in the future, however, that depends on what I learn from you. I am in the automobile business and have the distribution for ———" (making a well known make of car).

Both I and some friends of mine have been making the state of the things you said and I have been obligated to come up here and see you. We feel that some one in our community is going to go into the aviation business and we have decided that if there is any sound business future to do that we might as well be the ones to start with no expense.

So short we want to know what likelihood of success such a prospective business would have in our state and state territory (the city is question was one of 25,000 population in the midst of a prosperous agricultural area) and presented the elements for success as good how to get started and what to do afterward.

I was that was on hand under other information. I recognized that by giving him a short presentation of the facts, as I see them, I would accomplish two results. In the first place I would secure an excellent prospect for the products of the company I represented, who would be very kindly disposed towards me; and in the second place, provided I did do business with him on such a basis, I would be no back-biter or class of misrepresentation in the future.

I gave him I think it is very appropriate to expect a word of encouragement against those and of whom there

are entirely too many in the aviation business, who make a practice of spreading an immense amount of misinformation before concerning the numerous opportunities of making quick business out of the aviation business. I remember hearing the cockling part of the sales presentation of a salesman representing another company. I am sure something like this.

"I had this getting your flying field free from the city, if you work it right, figures from other fields show that you should easily get 100 students the first year at an average of \$500.00 per student. Fifty per cent of these students will buy planes from you, each side producing a profit on the average of \$1,800.00. There's a profit right there of \$75,000.00 to say nothing of sales to customers, gas and oil, baggage rent, repairs, service work of all kinds, and so forth and so on."

It is my experience that salesmen of that sort work a "bait" like that line their jobs after awhile but it is the numerous they have done a lot of irreparable damage both to their own firms and to the industry at large.

"If I am going to answer your first question later, I want to say to my visitor, 'See the question of success depends absolutely on how you get started and your associates following. The first step is to provide yourself with a flying field. I presume you have a showroom in your business probably along with a service department and repair shop in the rear. Now the flying field in the corresponding place of business is aviation. It should be as close to town as possible but get far from dangerous hazards around it, such as trees, buildings, telephone poles and wires, etc. The size of the field necessary will be determined by the number of, or lack of, the above named hazards."

There are two main methods of obtaining a flying

Edie: One is to go out and buy it yourself with savings, capital—the other is to raise the interest of the city in having a municipal airport and buy it through a bond issue. The first is preferable for then you can always be your own master and do what you please, however small that freedom is. The latter is the interest of equal weight. If the latter, since you might use the field can be leased from the city at a nominal yearly rental. If possible, however, a contract should be entered into with the municipality, giving you the exclusive right to operate the field for the city. "This is very advantageous for it gives you additional sources of revenue, such as all gas and oil sold on the field and the right to either operate yourself or lease out other valuable concessions. Many cities are glad to do this because so many owners they are finding out it is ineffective for them to be in the aviation business, which is what it amounts to if they attempt to operate the field themselves. A fair rental for the exclusive right would be the interest on the bonds sold representing the total investment in the field, buildings and general equipment."

My student interrupted me at this point.

"But it looks to me as though I'm going into a lot of things besides selling airplanes. This primarily a salesman and I thought that I could use my air selling experience in this field. I'm not particularly interested in a lot of operations."

"I'll leave you brought that up," I returned. "Because it brings out a point that is very important. You can use your air selling experience to great advantage as I will show you, but there is a basic difference between your present business and the one you are contemplating, which I shall try to explain."

"In the conduct of your business the selling of new and used cars is the main department. You also repair cars, sell gas and oil, rent storage, sell accessories, and do all kinds of general service work. It has been said that the success of the automobile dealer lies not in his showroom but in the class of service he gives back to his shop to the owners who have brought cars from him. Your success in this department, however, can be traced directly to the showroom, for the same selling ability that sold the cars back will sell your service back shop. In other words, the foundation of your business is salesmanship."

"Now as aviation the selling of planes will not be your

main department, as it is in your car agency. The situation will be reversed. Your operations department, which is also to run service and accessory work, will be your main consideration. Whether this will be true in one or different ways from now I am not prepared to say, but there is no question but that it is so at present. However, the prime requisite for success here, as in your car service department, is sales ability. You are always selling no matter whether it be a flying school course, a cross-country flight, or just a short hop around the field."

"Well, that sounds better," stated my student. "I can begin to see where I could fit in a future life here. Now what do you do after having acquired a field?"

"The next step is the proper equipment of the field," I returned. "And that will be determined by the amount of money you can afford to invest. However, whether the field will be municipal or private, after the surface of the field is put in proper shape for flying, a medium sized hangar should be constructed, which should accommodate at least five average sized ships. A small office should be provided as well as shop facilities. Connected gas and oil service are essential. To have good lighting equipment is very advantageous but not necessary, however, it should be added in, so far as possible. "This problem of layout and equipment is a specialized subject in itself and is, indeed, in every case. We have an accessories department in our business, and I will be glad to arrange for an engineer to visit your city, look over the situation and make the proper recommendations."

"I can readily see," said Mr. Jackson at this point, that the basic investment in the aviation business far exceeds that required in the automobile."

"That's true," I returned. "Instead of the limited space of a showroom and shop you have a whole flying field and the space required to store five airplanes will store 25 automobiles easily. This fundamental difference will tend to keep you in the moderately financed fly-by-night dealer and will bring into the business only those of proven worth and unquestioned integrity."

"After the flying field and equipment is provided for the next step is to make arrangements for operating and sales work. However, there is one point that I want to emphasize right now. The single factor that is most essential to success, from any one, after it, is sales management. If there is one attribute the aviation business is craving for more than any other task, it is experienced business leaders. (What are interested) your

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business men. I therefore urge upon you the necessity of placing yourself in some other line of personal judgment at the head of the enterprise. If this is provided for, the business will succeed. You will have to be, some jobs will be aviation flying operations, probably along a great deal of it himself. He pointed by his suggestions but we were over judgment."

"The uncertainty has shown that in the formation of such a business as you contemplate a natural division of activity, and consequently, investments will take place. Your main sources of revenue will come from the operation of a flying school, cross-country, trips and short local sightseeing trips—sales of plane sales of gas and oil, and investments in repair and service work of all kinds."

In order to do any kind of flying you will have to have an airplane, then the problem will arise, where do you buy it? You will be brought by many salesmen, each with a different "line" and line of ships. Beware of the fellow who tries to sign you up on a contract requiring the maintenance of a certain schedule. You don't know how many ships you are going to sell the "leasing year." You may not sell any and still make money. Of course requirements in individual cases will vary but to start in a variable way you should have a good rugged touring ship and one, probably a cabin job, suitable for cross-country trips and short hops."

The price of an airplane will not be the most important factor as it will be paid later. In the aviation field business this is not so because a dealer is known and spoken of by the name of his business. However, in the early days of the automobile this was not so, he was known as the local man selling "horrible bargains," and you will be known locally as the "airplane man" and your flying field as community headquarters for aviation."

You will come in contact with factory representatives selling only one plane, and with others that represent groups of companies which have a line of many types of planes or factory sales. Selection is an individual thing to sign a contract with such a company both for the prestige it affords you and also the wide variety of products which you can buy on one contract. It is better to offer a complete line of ships, you sign several contracts with several manufacturers, you have the opportunity of purchasing all of your requirements from one manufacturer, whose contract if on a sliding scale, as most permits you greater discount possibilities, by as passing your purchases."

It is most true, if possible, to have your school endorsed by the Aeronautics Branch of the Department of Commerce by the procurement of an Approved School Certificate. As soon as your field is opened you will be visited by an inspector for the government when you will find it to be very common and eager to help you in any way possible. In fact the application will be able to give an exact amount of cash value."

Experience has shown that an attempting to sell planes it is more and more successful for the average small dealer to try to cover a considerable territory, making sales demonstrations, trying to open up new agents or close retail sales. It costs money to fly the planes and the trade is beginning to discover that. Except in very unusual circumstances, no long cross-country flights should be made in the hope of closing a sale. (Change for the trip—the prospect will respect you more.) Confine all your sales demonstrations flying in the home base."

A further factor of considerable importance in the

consideration of the small dealer is that of insurance. In the case of the larger operating companies this covered insurance of all activity covers a wide area and perhaps the whole country, their operations run into such large figures that their own fly insurance at a wholesale price, covering from the cost of such a particular unit.

In the case of the small dealer that is impossible. He has to pay the full retail price for insurance. It is easy to see why the larger operating companies this covered insurance offered to do a lot of cross-country work and flying at the same time, the small dealer cannot afford it.

If you are so close to any of the main airways of the country you will be improved at the amount of business you will pick up from these planes. One little airport out in Kansas has averaged three visiting planes a day for the past year, carrying over 1000 passengers and small supplies of various kinds, baggage, mail, etc., and accessories are essentially your "bread and butter." By careful management this can be made to pay your fixed overhead.

The personal requirements of such an organization are small. A business manager, stenographer and bookkeeper combined, pilot and mechanic are ample and in these cases the work can be handled by less than four

"I" is never again to the subject of business management. I believe that therein lies the crux of the matter. It is important to make a complete inventory of the office and all business arrangements, particularly everything that has to do with accounting or handling accounts. This big problem, as well as that of the entire organization, is to sell his commodity, not airplanes, flying courses or cross-country trips, but the very thing of aviation itself. If the basic significance of flying is safety, safety and practicability, can be sold to the house hold, all these others will follow. There will be flying studios, cross-country flights, sightseeing tours, and sales of planes. All of this activity will result in a certain average number of flying hours per year. This, of course, will vary according to the size of the business and the uncertainty in which it is based, but which is absolutely essential to success."

The confidence of the community will only be won through the most rugged watchfulness and care. The pilot should be instructed never to take any chances. Air planes are gradually being made better and more simple and scientific developments are slowly coming which will enable the operator of aircraft to overcome the handicaps of bad weather. However, leave all such considerations to those who are opposed and qualified for such work."

You will be able to utilize many of the up-to-date selling methods which you have used successfully in your automobile business. If you merchandise aviation methodically and persistently you will succeed. Much of the price is making one of the actual flying and mechanical work at the air port you will be out selling. You will have a very friendly contact with your local paper and you will find a ready ally them for the furtherance of your plans. You can get in your work in the paper and if you are an expert they can recover the paper from an immense amount of advertising through the news columns. You will have a prospect list of possible plane owners; flying and ground school students, and business men who can probably either cross-country trips. You will work with the driver, the telephone and personal interview. When the weather is too bad for flying you will have your pilot down selling, too."



The Allen Flying Service Airport at Columbus and a typical winter scene

GENERAL NEWS

Homer F. Powers, Staff Editor

Fokker Becomes Holding Company

Titled General Aviation Corp.; to Add U. S. Division

NEW YORK (AP) — Acquisition of the Dornier Company of America is planned by a new holding firm to be known as the General Aviation Corp., of which Fokker Aircraft Corp. will own the nucleus and General Motors hold large shares.

The announcement made by Hiram M. Hahn, president of the Fokker company, stated Fokker will change its name to the General Aviation Corp. previously known as a holding company, while the future manufacture and sale of similar planes now made to be carried on by a subsidiary unit.

An Stock Exchange Controversy.

The virtue of the fact that General Motors owns 40 per cent of the Fokker stock, and, second, with Fokker the Dornier Company of America had, October 1, is expected the automatic concern will own a majority of stock in the new corporation.

As an exchange in stock is planned by the General Aviation Corp. for present Fokker shares, General Motors will receive a 51 per cent interest in the new corporation prior to the taking of the Dornier shares.

Meanwhile, it was reported that negotiations are being carried on with a view of changing other companies for the new holding firm and that interest in it is being expressed that Fokker is likely to be awarded to permit raising the capital stock from 1,000,000 shares to 3,000,000 common shares on par value.

While Hahn said the announcement issued by Hiram M. Hahn reads as follows: "It is stated that the change of the corporate name and the increase of the authorized capital stock of the corporation was proposed to enable the company to carry on an expansion program which contemplates that the Fokker corporation will become primarily a holding company owning stock in subsidiary manufacturing and engineering companies whose manufacture and activities will be carried through units of the parent corporation."

"If the stockholders approve the proposed changes it is expected that the manufacture and sale of Fokker-type planes will be carried on by a subsidiary corporation which will be wholly owned by the General Aviation Corporation."

In conjunction with General Motors

Corporation, which owns 40 per cent of the issued common stock of the parent Fokker corporation, arrangements have been made for the right to manufacture and sell Dornier-type boats.

A new corporation called the Dornier Company of America has been recently organized under the laws of Delaware and it is expected that this company will also become a wholly owned subsidiary of the General Aviation Corporation.

The new Dornier subsidiary will replace the services at the Dornier factory at the Dornier flying boat which has been recently developed and operated in Europe and expects to change in the manufacture of new types of Dornier flying boats adapted for use in this country.

The controlling part of the plan does not involve any exchange of the existing shares for new securities. It is stated that the 360,000 additional shares of common stock without par value which it is proposed that the General Aviation Corporation shall be authorized to issue if the circumstances are approved by the stockholders, will be issued for the acquisition of additional property for which securities are now being created on."

Complete Tests of New Northrop

LOS ANGELES (AP) — Simultaneous completion of factors and field tests of the new Northrop F-86F fighter jet, which is now in production, will be completed by the end of the year, according to Northrop officials. The new plane is being tested by the U. S. Air Force at Edwards Air Force Base, Calif. The new plane is being tested by the U. S. Air Force at Edwards Air Force Base, Calif. The new plane is being tested by the U. S. Air Force at Edwards Air Force Base, Calif.

Chief Officers of Fokker Firm

NEW BRUNSWICK (AP) — Officers of the Fokker Aircraft Wings Inc., New Brunswick, recently elected were Hiram D. Foster, president; M. Herbert Dornier, Jr., vice president; and Floyd F. Stein, secretary-treasurer. The Fokker firm manufactures a wide variety of aircraft and is expected to be a major player in the aircraft industry.

Name Gordon Bennett Balloon Race Officials

CLEVELAND (AP) — Directors of the National Air Race of Cleveland, Inc., the new private organization, presiding over the Gordon Bennett Balloon Race, have named those who will officiate at that event this year's race which will be held at the Ohio State Fair grounds.

The operations officer at the race will be Capt. William E. Flood of the Army, who has held the same position at previous races, while Capt. Charles E. Black, U. S. N., will be referee. Major Albert Paul Lander, Jr., of the Army, will be judge. P. W. Litchfield, Goodyear-Zepplin Corp., president, chairman of the technical committee.

There will be Maj. Lutz Christen, secretary of the Canadian Committee of the National Aeronautic Association, and Col. F. Scherer of Philadelphia.

Oreille Wright, and Col. Charles M. Young, David S. Hughes, and F. T. Dornier, Assistant Secretaries of Commerce, Navy and War for Army matters, respectively, will act as judges. C. A. Hughes, chief of the survey station at Cleveland Airport, will be assistant referee.

The official news for the race and attendance of the aerial exhibition "The Gordon Bennett International Balloon Race and Aerial Circus" will be held at the Ohio State Fair grounds, which will be held at the Ohio State Fair grounds, which will be held at the Ohio State Fair grounds.

Republic Steel Officers United

YOUNGSTOWN (AP) — Consolidation has been completed of the office headquarters of the Central Aircraft Manufacturing Corp. formerly located at Marietta, Ohio, with the general sales offices in this city. J. J. McLaughlin, vice president, was named as chief of sales at the Central Aircraft Manufacturing Co., an aircraft manufacturing company of New York City. The new office will be located at the Central Aircraft Manufacturing Co., an aircraft manufacturing company of New York City.

Miami Passes Licensing Law

MIAMI (AP) — An ordinance which will require a license to Department of the Goodyear-Zepplin Corp. this city. The new ordinance will require a license to Department of the Goodyear-Zepplin Corp. this city. The new ordinance will require a license to Department of the Goodyear-Zepplin Corp. this city.



VanOrman in Bennett Name Army Balloonists

HOUSTON (AP) — Ward T. VanOrman of Goodyear, former of last year's International balloon race, will not compete in the National Exhibition Balloon Race from Houston, Tex., as last 10. A crew composed of Roland J. Elzer, a former racing pilot with the Goodyear-Zepplin Corp., and Frank J. Trotter, a Goodyear student pilot, will represent that firm in place of VanOrman.

VanOrman, by virtue of his winning last year's Gordon Bennett International Balloon Race, automatically becomes eligible for this year's international contest. His decision not to take part in the Houston race was made after a conference with P. W. Litchfield, president of Goodyear, and other officials, and before a proposed scheduled test by the Army Air Corps.

The Army Air Corps has selected the following teams to participate in the exhibition race: Lorent, Walter D. Best (pilot) at Langley Field, Va., and Louis John P. (pilot) at Fort Belvoir, Ill.

Capt. Karl S. Auer, (pilot), at Wright Field, Ohio, and Capt. R. E. H. (pilot) at Fort Belvoir, Ill.

Leut. William B. Turrell (pilot), and Leut. Conrad M. Brown (pilot) both stationed at Scott Field, Belleville, Ill.

The Government Officers for the Army Air Corps teams in Louis John McLaughlin, who is stationed at Fort Belvoir, Ill.

Advertising Carried by New England Firm Ship



Delivery of the first small ship to a destination for commercial use was made at Norfolk last week by the Goodyear-Zepplin Corp. this city. The new ship, which is being used for advertising, is being used for advertising, is being used for advertising.

Expect 25 Planes in Penna. Tour PHILADELPHIA (AP) — Approximately twenty-five planes from 13 air bases of Pennsylvania are taking part in a one-day air tour of the state starting from Philadelphia on Tuesday. The tour will be held on Tuesday, May 26, and will be held on Tuesday, May 26, and will be held on Tuesday, May 26.

Actuarial Body Studies Aero Branch Statistics

WASHINGTON (AP) — Department of Commerce studies on safety and accident records in the aviation industry have been made available to the Actuarial Society of America, which was held at the National Aeronautics Association's annual meeting in New York City.

"We believe," Colonel Young said, that a great many people do not realize the advantages of air transportation, and we think there is a lack of interest in the industry, and we think there is a lack of interest in the industry, and we think there is a lack of interest in the industry.

"We believe," Colonel Young said, that a great many people do not realize the advantages of air transportation, and we think there is a lack of interest in the industry, and we think there is a lack of interest in the industry, and we think there is a lack of interest in the industry.

HIGH POINTS
in the NEWS

For Airlift. General Motors interests involved in General Aviation Corp., a new holding firm formed by Fokker Aircraft Corp., Dornier Company of America, is to become a subsidiary.

Defended again. Sixty billion cotton-crops in House hearings being held on Washington last, announcing completion of American grain.

Debris in the Swamp. Air Races this year will be composed of two events for women and three for men.

In the Northwest. Some twenty planes and pilots are expected to be in the air on the Northwest coast. The air show is being held in the Northwest coast.

Only 10. In the Northwest. Some twenty planes and pilots are expected to be in the air on the Northwest coast. The air show is being held in the Northwest coast.

Twice daily. Varney Air Lines will start twice-daily passenger service on its mail line between Portland, Me., New York, and San Francisco.

Looking ahead. Tulsa, Okla., is expected to receive for Agricultural Chamber of Commerce third annual National Air Conference, held last year at Dallas.

Landed. Twenty-year-old Andy Johnson is planned for his last trip from Seattle to Australia in a private and one-half ship. Much said.

Cruising near. Gen. Zepplin flies northwest over South America after crossing the Gulf of Mexico to Pennsylvania leg is 51 ft.

Nebaska Tour Lengthened

LINCOLN (AP) — An extra day has been added to the recent Nebraska air tour, which is expected to be held in Lincoln, Neb. The air tour is being held in Lincoln, Neb. The air tour is being held in Lincoln, Neb.



SIDE SLIPS

By
Robert R. Osborn

How to Buy a Jummy

THE INTERIOR AVIATION and his partner-in-crime, The Southern Mechanic, came in the other day and had the following about of ads on our desk after first clearing a space by removing a number of our copies. They explained that eventually it was getting increasingly harder to obtain a good Jummy from any source and they thought that the readers of AVIATION might appreciate a few recommended pointers on what to look for when buying a Jummy. We realized at once that this was becoming a serious problem, and we knew that the boys knew whereof they wrote, so we were ready to press with a special column containing this information for our readers.

WHAT TO LOOK FOR IN BUYING A JUMPER PLANE A FOLLOW

1. Look into the gas tank. If the gas is considerable above the pump the ship is worth at least \$500. It might even be worth \$600 if the tank is full but it also happens to be very suspicious that something serious is wrong with the ship, as we have never seen a full Jummy gas tank in our career.

2. Take out your pen knife and cut the shock cord in the landing gear on one or both sides. If it springs out, it was OK, but if it was dead the fellow was trying to rip you. In any event, tell him you won't take his ship unless he is ready to see stock cord.

3. Count the number of bags in each side of the wing. If there are two bags each side with an overhang on the upper side it is right. If the number of bags on each side is not equal, that the ship should not fly the bag side and into up evenly as this makes the ship look much better and more holding a lot of adhesion and rubber. If the wing overhangs on the lower instead of the upper side the ship has either been crashed hard or the fellow was stalling when he repaid it the last time. You can positively tell by looking at the fellow which it was.

4. If the wings are attached right side up the heavy curved side of the wing should be on top and it is only the modern section like the Guggenheim or the M-4 section which

should lead, like they was on upside down. If he has the wing on upside down, once again it doesn't make much difference except it appears and one panel or the other should be changed to be consistent. Remember it is the good appearance of the ship which counts with the prospective passenger.

5. Shake the wings violently up and down. That rattling noise is heard all the time that is OK, but he says to remember about this so as to not get the gear down. If the wing up seems to be waving around a bit and loose, sort of, it might be a heated beam, so be sure to cut the wires in use. Do this while the ship still belongs to him, as you can't afford to inspect things like that after you've bought it.

6. Don't waste much time looking at the engine as it won't be worth much anyway. Just squint at it as say "Oh well, I have another engine I can put in the ship so it doesn't make as much difference that this one is so terrible. I can use it as a spare, as a new overhead, as a new propeller as a new wing as a new engine as I guess I can use it for spare parts." He will claim it has just had a complete overhaul and is running sweet but this is obviously bogus for if the engine wasn't happy, why would he be selling the ship?

7. Look the longest over the ship. There should be at least three good legs, especially all at the cockpit as it is crucial it is unbalanced to have the tail fall off at any height above three hundred feet or on a good road running the ship might get higher than that.

8. Make sure that the wheels track together in some direction. They don't need to track straight ahead as long as they point together in some direction. When the wheels get away that they depart and it isn't so much the fault as you have to make all cross-wind take-offs and landings.

9. Look down under the cockpit as under the tailfeather to see what sort of vegetation is there. If grass and weeds and such is growing there the ship has been left on a lot, whereas if the weeds are yellow and maybe a mushroom or two it is evidence the

ship has probably been either in a hangar or the shade, most likely the shade.

10. If you intend to use the ship for student training make sure you have the regulation weight for rectangular within proper rear seats of the instructor.

11. Tell the owner you want to see if there is any Blubber in the oil, unless the plug is then immediately drop it so that all the oil drains out of the sump. Then he has to give you a fresh filling of oil which will assure you that you can catch a passenger or student to finance further operations.

12. To try out the talent just go around looking at the wings and fuselage. If you are able to look a closer or so holes through the cover just don't buy it as if you can't look holes in it buy the ship to master when due is wrong with it. The master will follow you around waving his hands or saying it has just been all overhauled but don't pay no attention to him as that is bogus.

13. If the ship has this number on it anywhere, such as identification or serial number, why don't buy it at all.

14. If the rubber is not of warped and wavy don't worry about that. If it is bad it will just throw you off your course a bit but that doesn't make any difference as who knows where he is going in a Jummy?

15. Make sure all of the holes in the instrument board has instruments or dials of some sort in them. The instruments won't work of course, but it always represents the passenger positively if there is a window to see the instruments were very checked with a worried look on your face and then made as if everything is fine.

16. Offer him half what he wants for it. If he takes it there is something very wrong with the job, so then offer him quarter what he asks. If he agrees about any price you happen to look on just name a dollar or two under his most or half take it if he thanks you going to pay in real money. You can sometimes borrow the dollar or two from some one before you come to the deal.



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The Business Week takes the view that since aviation is a business the sooner it sheds its sports clothes and gets into a business suit the better. The true progress of flying is now in the form of business enterprise—large and

small investment, organized transportation and aviation, direct adaptation of the plane to public transportation service. It is not so much of exotic thrillers or sensational stories in the Sunday supplements, or my John Wayne investors plotting a fantastic air-future.

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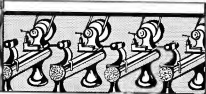
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